CLAIMS

What is claimed is:

1. An organic memory device, comprising:

an organic semiconductor material to store information;

a passive layer adjacent to the organic semiconductor material, wherein the passive layer facilitates the storage of the information;

two electrodes sandwiching the organic semiconductor material to access the organic semiconductor material, the organic semiconductor material comprises a non-polar chain and a reactive end, the reactive end aligned with one electrode.

2. The memory device of claim 1, further comprising at least one layer that is formed in accordance with a damascene process.

3. The memory device of claim 1, further comprising at least one of a diode, a thin-filmed diode (TFD), a zener diode, an LED, a transistor, a thin-filmed transistor (TFT), a Silicon Controlled Rectifier (SCR), Uni Junction Transistor (UJT), and a Field Effect Transistor (FET) to facilitate access to the at least one layer and to facilitate stacking of at least one other layer.

4. The memory device of claim 3, the TFD is an organic device having a polymer layer formed between a cathode electrode and an anode electrode.

5. The memory device of claim 1, further comprising one or more global access lines to facilitate access to a plurality of organic memory structures formed in accordance with a common substrate.

6. The memory device of claim 1, the passive layer comprises copper sulfide.

7. The memory device of claim 1, the organic semiconductor material comprising a conjugated organic material.

8. The memory device of claim 1, the organic semiconductor material comprising at least one from the group consisting of polyacetylene, polyphenylacetylene, polydiphenylacetylene, polyaniline, poly(p-phenylene vinylene), polythiophene, polyporphyrins, porphyrinic macrocycles, thiol derivatized polyporphyrins, polymetallocenes, polyferrocenes, polyphthalocyanines, polyvinylenes, and polypyrroles.

9. The memory device of claim 1, electrodes independently comprise a material selected from the group consisting of aluminum, chromium, copper, germanium, gold, magnesium, manganese, indium, iron, nickel, palladium, platinum, silver, titanium, zinc, alloys thereof, indium-tin oxide, polysilicon, doped amorphous silicon, and metal silicides.

10. The memory device of claim 9, at least one electrode formed in accordance with at least one of a single damascene process and a dual damascene process.

11. A method of processing an organic memory device, comprising:

forming a channel in a semiconductor substrate material;

forming an electrode in the channel;

mixing a polymer solution comprising a conductive polymer and an organic solvent, the polymer comprising a polar group at one end and a non-polar, conjugated chain, and

depositing the polymer solution into the channel to form an organic semiconductor layer over the electrode, the polymer orienting itself so that the polar group is proximate the electrode and the non-polar chain extending away from the electrode.

12. The method of claim 11, further comprising mixing the polymer solution with a conductive polymer concentration to facilitate spinning the solution into the channel.

13. The method of claim 12. further comprising heating the polymer solution to increase the conductive polymer present in the polymer solution to a suitable concentration to facilitate self-assembly of the conductive polymer on an electrode.

14. The method of claim 11. further comprising placing the polymer solution in a vacuum to facilitate removal of the organic solvent.

15. The memory device of claim 11. the organic semiconductor material comprising at least one from the group consisting of polyacetylene. polyphenylacetylene. polydiphenylacetylene. polyaniline. poly(p-phenylene vinylene). polythiophene. polyporphyrins, porphyrinic macrocycles. thiol derivatized polyporphyrins. polymetallocenes. polyferrocenes. polyphthalocyanines, polyvinylenes, and polypyrroles.

16. An system to produce an organic memory device, comprising:

means for forming an opening in a substrate layer:

means for forming an electrode in the opening;

means for mixing a polymer solution comprising a polymer and an organic solvent. the polymer comprising a polar group at one end and a non-polar, conjugated chain; and

means for depositing the polymer solution into the opening to form an organic semiconductor layer over the electrode, the polymer orienting itself so that the polar group is proximate the electrode and the non-polar chain extending away from the electrode.

17. An organic memory device, comprising:

a first electrode formed in accordance with a damascene process within a substrate:

an organic semiconductor material having a reactive end and a non-polar end, the reactive end associated with the first electrode and the non-polar end extending away from the first electrode in a substantially perpendicular manner:

a passive material associated with the organic semiconductor material to facilitate data storage in the organic semiconductor material; and

a second electrode operative with the first electrode to at least one of store, erase, and access the data in the organic semiconductor material.

18. The memory device of claim 17, the damascene process is at least one of a single and a dual damascene process.

19. The memory device of claim 17, further comprising multiple storage units, respective storage units having an associated organic semiconductor material and a passive layer that are accessed by at least one of a localized and a global access line.

20. The memory device for claim 19, the multiple storage units are manufactured in at least one of a horizontal direction and a vertical direction with respect to the substrate in order tom facilitate higher density memory integrated circuits.

21. The memory device of claim 17, the organic semiconductor material comprising at least one from the group consisting of polyacetylene, polyphenylacetylene, polydiphenylacetylene, polyaniline, poly(p-phenylene vinylene), polythiophene, polyporphyrins, porphyrinic macrocycles, thiol derivatized polyporphyrins, polymetallocenes, polyferrocenes, polyphthalocyanines, polyvinylenes, and polypyrroles.